Upper Middle Miocene Progradational (MM9 P1) Play

Textularia "W" and *Bigenerina* 2 biozones

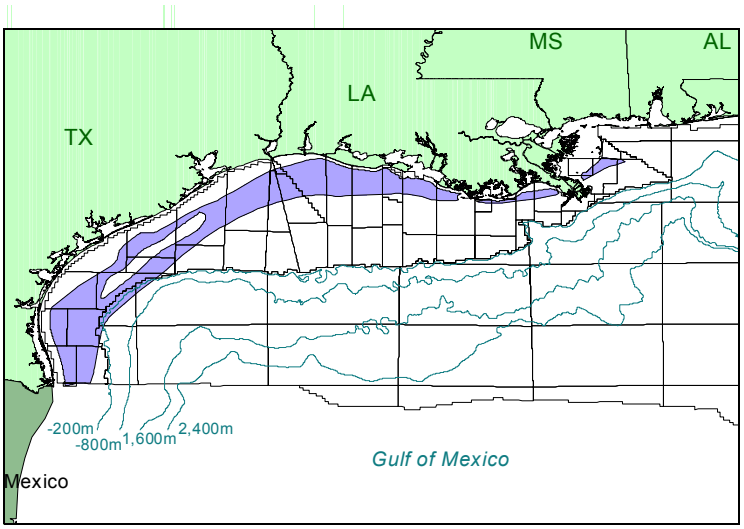

Figure 1. Play location.

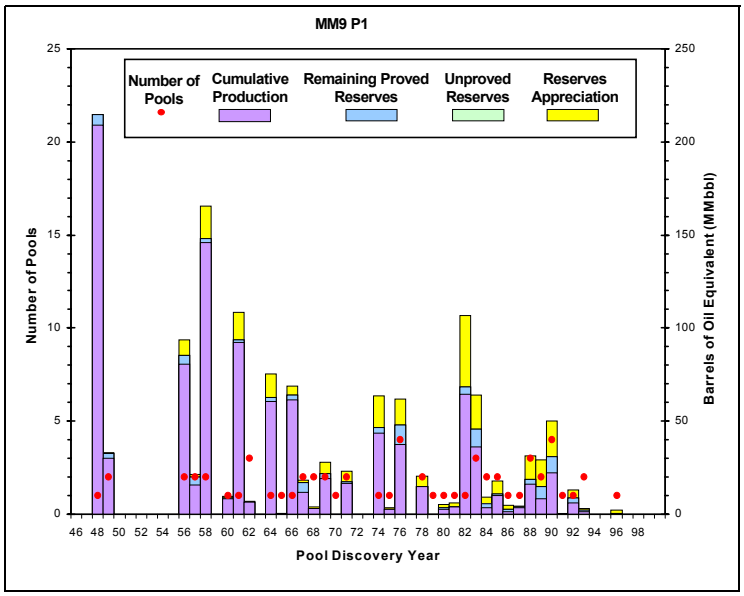

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

MM9 P1 Play 61 Pools 164 Sands	Minimum	Mean	Maximum
Water depth (feet)	11	52	274
Subsea depth (feet)	3802	8845	16067
Number of sands per pool	1	3	8
Porosity	22%	28%	32%
Water saturation	16%	29%	65%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Upper Middle Miocene Progradational (MM9 P1) play occurs within the *Textularia* "W" and *Bigenerina* 2 biozones. This play extends from the South Padre Island and Port Isabel Areas offshore Texas to the Main Pass Area east of the present-day Mississippi River Delta (figure 1).

Updip in offshore Texas, the MM9 P1 play grades into the deposits of the Upper Middle Miocene Aggradational (MM9 A1) play, while updip in Louisiana, the MM9 P1 play extends onshore. To the northeast, the MM9 P1 play is limited by the deposits of the Upper Middle Miocene Aggradational/Progradational (MM9 AP1) play overlying the Cretaceous carbonate shelf. To the southwest, the MM9 P1 play continues onshore into Texas and into Mexican national waters. Downdip, the play grades into the deposits of the Upper Middle Miocene Fan 1 (MM9 F1) play. In parts of the Mustang Island, Matagorda Island, Brazos, and Galveston Areas, the MM9 P1 play is limited by the Upper Middle Miocene Structural Corsair (MM9 S1) play.

Play Characteristics

Sediments in the MM9 P1 play represent major regressive episodes of outbuilding of both the shelf and slope. Additionally, retrogradational reworked sands associated with the *Bigenerina* 2 transgression locally cap the play. Because these sands are poorly developed and discontinuous, they are included as part of the MM9 P1 play.

In offshore Texas, sand deposition on the shelf was insufficient to develop an extensive prograding facies. In addition, the active regional Corsair Fault System of offshore Texas captured much of the sand that was available. MM9 P1 sands of

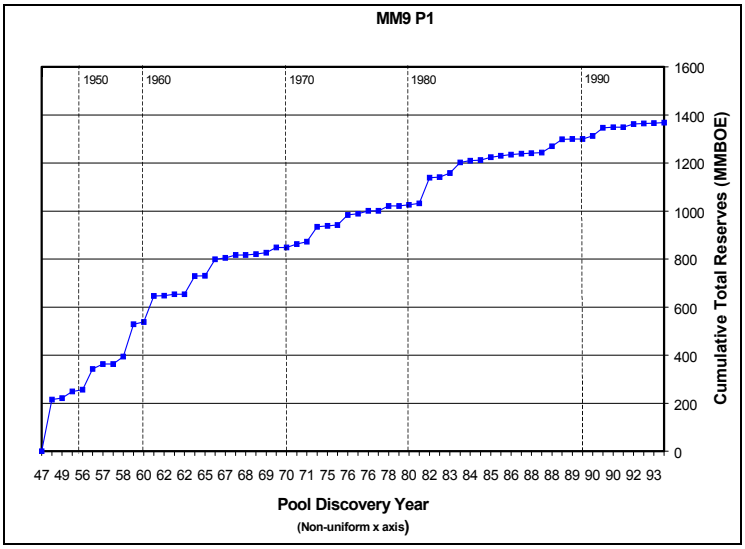

Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

MM9 P1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	61	0.105	5.749	1.128
Cumulative production	--	0.096	5.300	1.040
Remaining proved	--	0.009	0.449	0.089
Unproved	0	0.000	0.000	0.000
Appreciation (P & U)	--	0.037	1.138	0.239
Undiscovered Conventionally Recoverable Resources				
95th percentile	--	0.012	0.863	0.174
Mean	29	0.028	1.078	0.220
5th percentile	--	0.056	1.296	0.270
Total Endowment				
95th percentile	--	0.154	7.750	1.542
Mean	90	0.170	7.965	1.588
5th percentile	--	0.198	8.183	1.638

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

the Texas offshore were deposited in marine bars and in crevasse splays that are characterized by isolated spiky, prominent-to-subdued log patterns.

In contrast to the offshore Texas shelf area, the offshore Louisiana shelf area received greater sand input during MM9 time. MM9 P1 sands of the Louisiana offshore were deposited in delta fringes, channel/levee complexes, and distributary mouth bars. The thickest sand-dominated intervals probably represent stacked facies of multiple episodes of delta-lobe switching and progradation.

The majority of the fields in this play are structurally associated with normal faults. Other less common structures are growth fault anticlines and shallow salt diapirs. Seals are provided by the juxtaposition of reservoir sands with shales and salt, either structurally (e.g., faulting, diapirism) or stratigraphically (e.g., lateral shale-outs, overlying shales).

Discoveries

The MM9 P1 play is predominantly a gas play, with total reserves of 0.142 Bbo and 6.887 Tcfg (1.368 BBOE), of which 0.096 Bbo and 5.300 Tcfg (1.040 BBOE) have been produced. The play contains 164 producible sands in 61 pools (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools). The first and largest pool in the play was discovered in 1948 in the Vermilion 39 field, which contains 215 MMBOE in total reserves (figures 2 and 3). Discoveries have occurred at a steady rate throughout the play's exploration history. Over 70 percent of the play's cumulative production has been from pools discovered prior to 1971, while 97 percent of the play's cumulative production and 95 percent of the play's total reserves have been from pools discovered before 1990. The most recent discovery, prior to this study's cutoff date of January 1, 1999, was in 1996.

The 61 discovered pools contain 330 reservoirs, of which 304

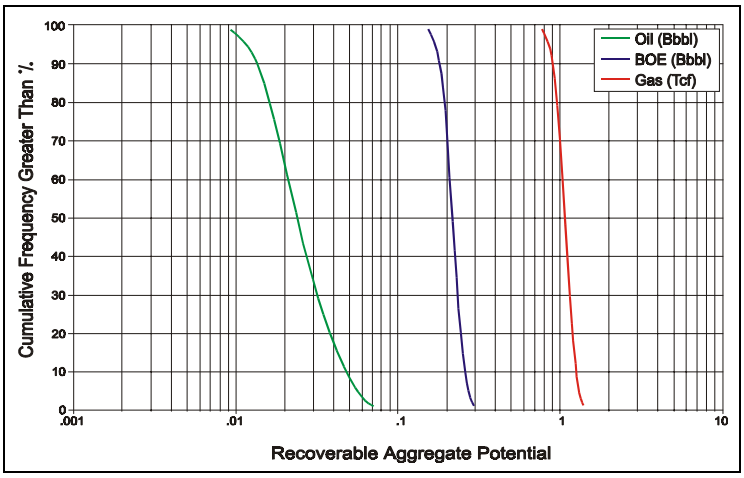

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

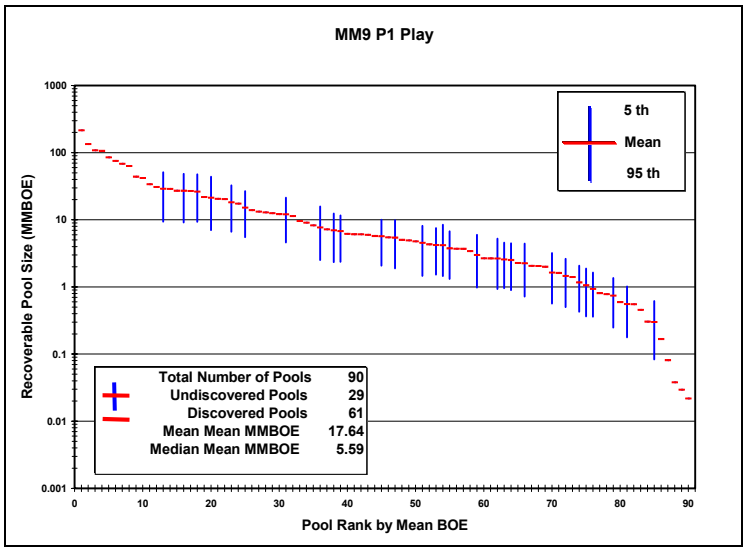

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

are nonassociated gas, 17 are undersaturated oil, and 9 are saturated oil. Cumulative production has consisted of 91 percent gas and 9 percent oil.

Assessment Results

The marginal probability of hydrocarbons for the MM9 P1 play is 1.00. The play contains a mean total endowment of 0.170 Bbo and 7.965 Tcfg (1.588 BBOE) (table 2). Sixty-five percent of this BOE mean total endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 0.012 to 0.056 Bbo and 0.863 to 1.296 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are estimated at 0.028 Bbo and 1.078 Tcfg (0.220 BBOE). These undiscovered resources might occur in as many as 29 pools. The largest undiscovered pool, with a mean size of 29 MMBOE, is forecast as the 13th largest pool in the play (figure 5). The forecast places the next four largest undiscovered pools in positions 16, 18, 20, and 23 on the pool rank plot. For all the undiscovered pools in the MM9 P1 play, the mean mean size is 7 MMBOE, which is smaller than the 22 MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 18 MMBOE.

The MM9 P1 is a mature play with mean UCRR contributing 14 percent to the play's BOE mean total endowment. Exploration potential in this play exists in small, subtle structures and downdip from existing fields on the upper slope where the MM9 P section may not be adequately tested.